
Description

The DIODES AP62150 is a 1.5A, synchronous buck converter with a wide input voltage range of 4.2V to 18V. The device fully integrates a 90mΩ (AP62150) high-side power MOSFET and a 65mΩ (AP62150) low-side power MOSFET to provide high-efficiency step-down DC-DC conversion.

The AP62150 device is easily used by minimizing the external component count due to its adoption of Constant On-Time (COT) control to achieve fast transient response, easy loop stabilization, and low output voltage ripple.

The AP62150 design is optimized for Electromagnetic Interference (EMI) reduction. The device has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which reduces high-frequency radiated EMI noise caused by MOSFET switching.

AP62150 is available in a TSOT26 package.

Features

- V_{IN} Range: 4.2V -18V
- Output Voltage range: 0.8V to 7V
- 1.5A Continuous Output Current
- 0.8V ± 1% Reference Voltage (T_A = +25°C) => AP62300 and AP62301
- 135µA Low Quiescent Current
- 1.3MHz Switching Frequency
- Up to 88% Efficiency at 5mA Light Load
- Proprietary Gate Driver Design for Best EMI Reduction
- Protection Circuitry
 - Undervoltage Lockout (UVLO)
 - Cycle-by-Cycle Valley Current Limit
 - Thermal Shutdown
- Totally Lead-Free & Fully RoHS Compliant
- Halogen and Antimony Free. “Green” Device

Applications

- Flat Screen TV Sets and Monitors
- Set Top Boxes
- Consumer Electronics
- Network Systems
- General Purpose Point of Load

Typical Applications Circuit

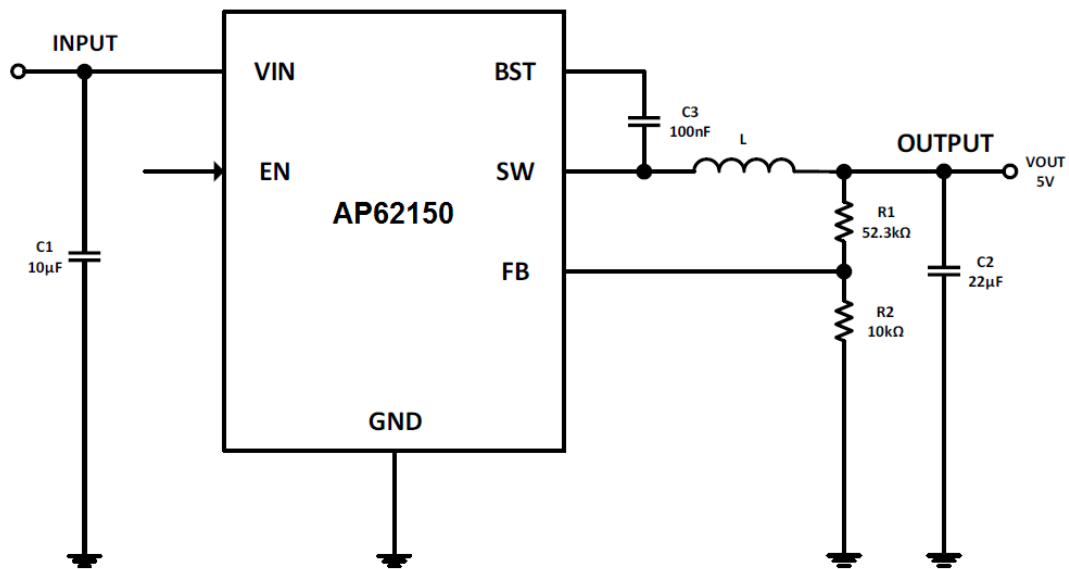


Figure 1. Typical Application Circuit

Absolute Maximum Ratings

| Symbol | Parameter | Rating | Unit |
|---------------------------|-------------------------|--|------|
| VIN | Supply Pin Voltage | -0.3 to +20.0 (DC) | V |
| | | -0.3 to 22.0 (400ms) | |
| V _{SW} | Switch Pin Voltage | -1.0 to VIN + 0.3 (DC) | V |
| | | -2.5 to VIN + 2.0 (20ns) | |
| V _{BST} | Bootstrap Pin Voltage | V _{SW} - 0.3 to V _{SW} + 6.0 | V |
| V _{EN} | Enable/UVLO Pin Voltage | -0.3 to +6.0 | V |
| V _{FB} | Feedback Pin Voltage | -0.3 to +6.0 | V |
| T _{ST} | Storage Temperature | -65 to +150 | °C |
| T _J | Junction Temperature | +150 | °C |
| T _L | Lead Temperature | +260 | °C |
| ESD Susceptibility | | | |
| HBM | Human Body Mode | 2000 | V |
| CDM | Charge Device Model | 500 | V |

Recommended Operating Conditions (At T_A = +25°C, unless otherwise specified.)

| Symbol | Parameter | Rating | Unit |
|------------------|--------------------------------|-------------|------|
| V _{IN} | Supply Voltage | 4.2 to 18 | V |
| V _{OUT} | Output Voltage Range | 0.8 to 7 | V |
| T _A | Operating Ambient Temperature | -40 to +85 | °C |
| T _J | Operating Junction Temperature | -40 to +125 | °C |

Setting Output Voltage

Table 1 for AP62150 shows a list of recommended component selections for common output voltages.

| VOUT | R1 | R2 | L1 |
|------|--------|------|-------|
| 1.2V | 4.99KΩ | 10KΩ | 1.2μH |
| 1.5V | 8.66KΩ | 10KΩ | 1.5μH |
| 1.8V | 12.4KΩ | 10KΩ | 1.8μH |
| 2.5V | 21.5KΩ | 10KΩ | 2.2μH |
| 3.3V | 31.6KΩ | 10KΩ | 3.3μH |
| 5.0V | 52.3KΩ | 10KΩ | 3.3μH |

Table 1. Common Output Voltages (AP62150)

Evaluation Board

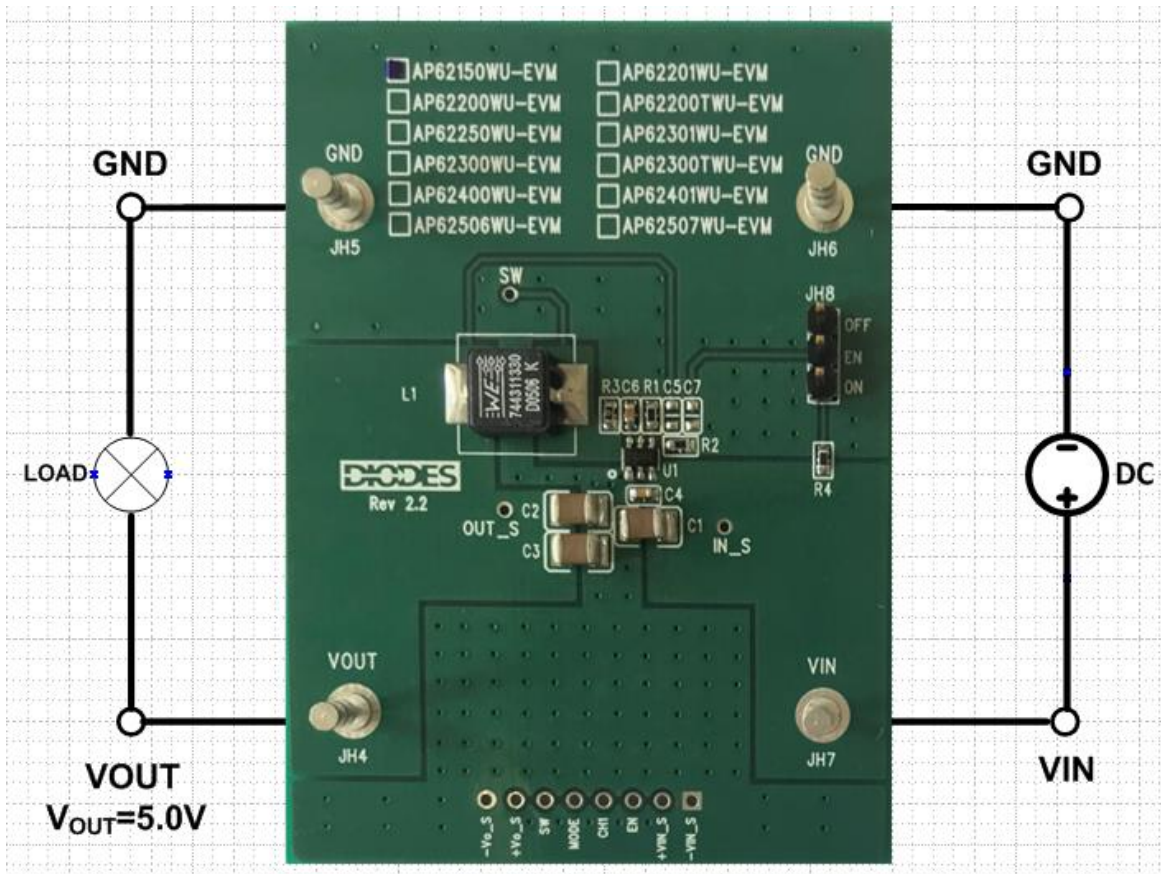


Figure 2. AP62150WU-EVM

Quick Start Guide

The AP62150WU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP62150, follow the procedure below:

1. Connect a power supply to the input terminals VIN and GND. Set VIN to 12V.
2. Connect the positive terminal of the electronic load to VOUT and negative terminal to GND.
3. For Enable, place a jumper at JH8 to "ON" position to connect EN pin to VIN through 100KΩ resistor to enable IC or leave it OPEN. Jump to "OFF" position to disable IC.
4. The evaluation board should now power up with a 5.0V output voltage.
5. Check for the proper output voltage of 5.0V ($\pm 1\%$) at the output terminals VOUT and GND. Measurement can also be done with a multimeter with the positive and negative leads between VOUT and GND.
6. Set the load to 1.5A for AP62150 through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency.

Measurement/Performance Guidelines

- 1) When measuring the output voltage ripple, maintain the shortest possible ground lengths on the oscilloscope probe. Long ground leads can erroneously inject high frequency noise into the measured ripple.
- 2) For efficiency measurements, connect an ammeter in series with the input supply to measure the input current. Connect an electronic load to the output for output current.

Evaluation Board Schematic

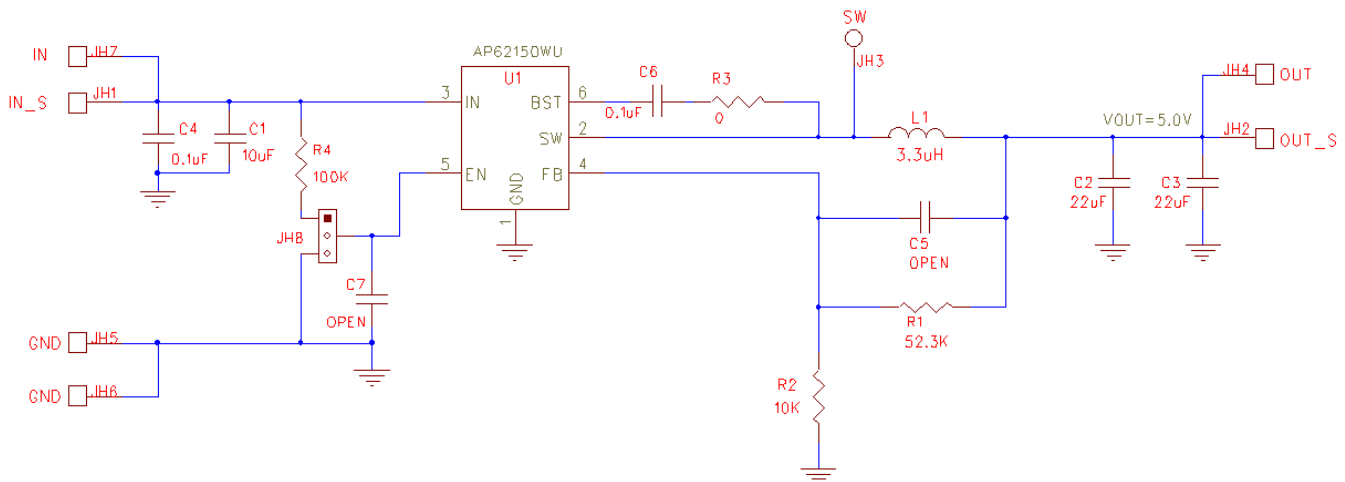


Figure 3. AP62150WU-EVM Schematic

PCB Top/Bottom Layout

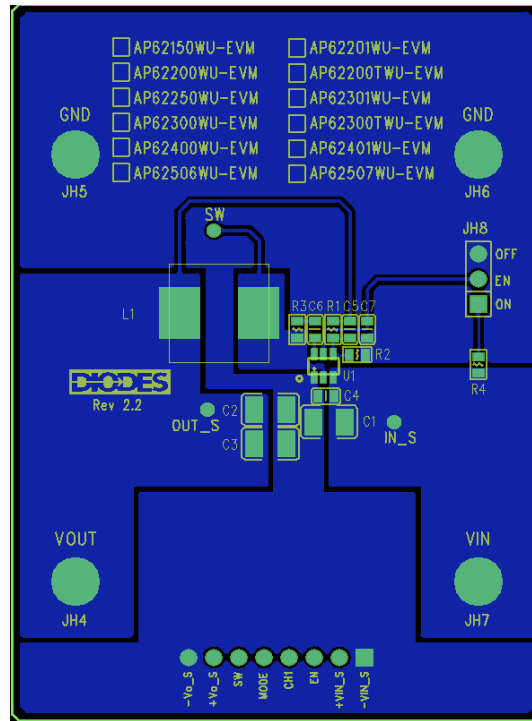


Figure 4. AP62150WU-EVM – Top Layer

PCB Bottom Layout

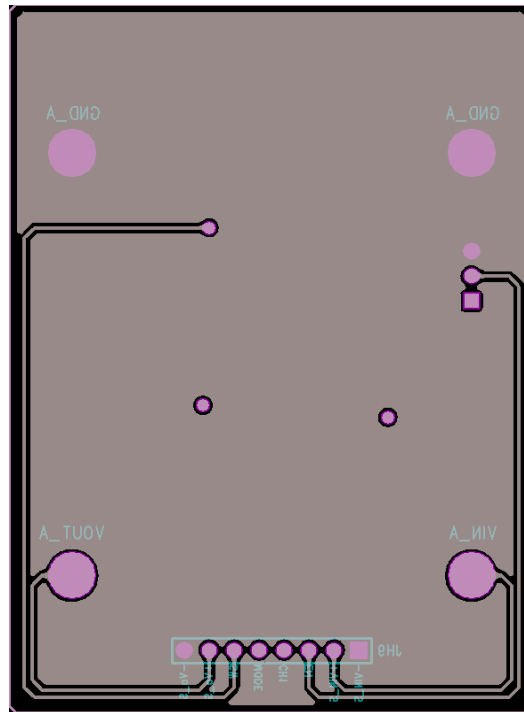


Figure 5. AP62150WU-EVM – Bottom Layer

Bill of Materials for AP62150WU-EVM for V_{OUT}=5V

| Ref | Value | Description | Qty | Size | Vendor Name | Manufacturer PN |
|--------------------|----------------|---|-----|-----------------|-------------------|--------------------|
| C1 | 10 μ F | Ceramic Capacitor, 25V, X5R | 1 | 1210 | Murata | GRM32DR61E106KA12L |
| C2, C3 | 22 μ F | Ceramic Capacitor, 25V, X5R | 2 | 1210 | AVX | 12103D226KAT2A |
| C4, C6 | 0.1 μ F | Ceramic Capacitor, 50V, X7R, 10% | 2 | 0603 | Samsung | GCJ188R71H104KA12D |
| L1 | 3.3 μ H | DCR=17.2m Ω , Ir=6.5A | 1 | 6.9 x 6.9 x 4mm | Würth Electronics | 744311330 |
| R1 | 52.3K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF5232V |
| R2 | 10K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF1002V |
| R3 | 0 Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3GEY0R00V |
| R4 | 100K Ω | SMD Resistor, 1% | 1 | 0603 | Panasonic | ERJ-3EKF1003V |
| JH4, JH5, JH6, JH7 | 1598 | Terminal Turret Triple 0.094" L (Test Points) | 4 | Through-Hole | Keystone Circuit | 1598-2 |
| JH8 | | PCB Header, 40 POS | 1 | 1X3 | 3M | 2340-6111TG |
| U1 | AP62150 | Sync Buck DC-DC converter | 1 | TSOT26 | Diodes Inc | AP62150WU-7 |

Typical Performance Characteristics

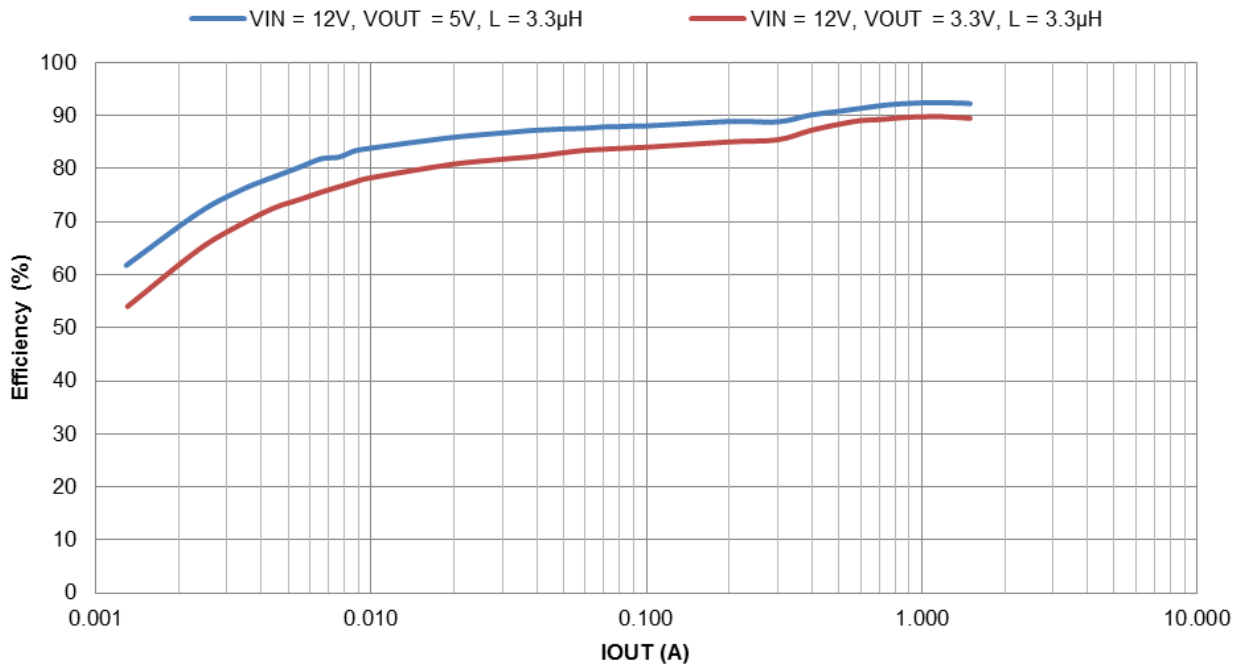


Figure 6. AP62150WU-EVM Efficiency

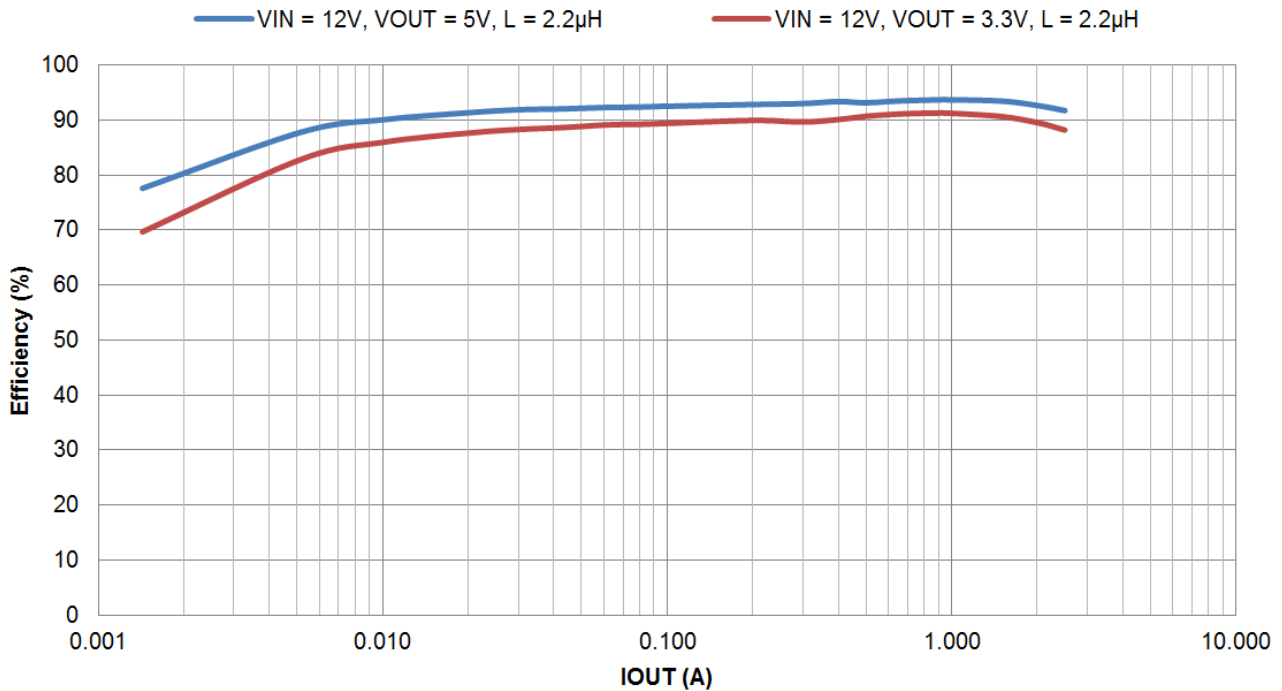
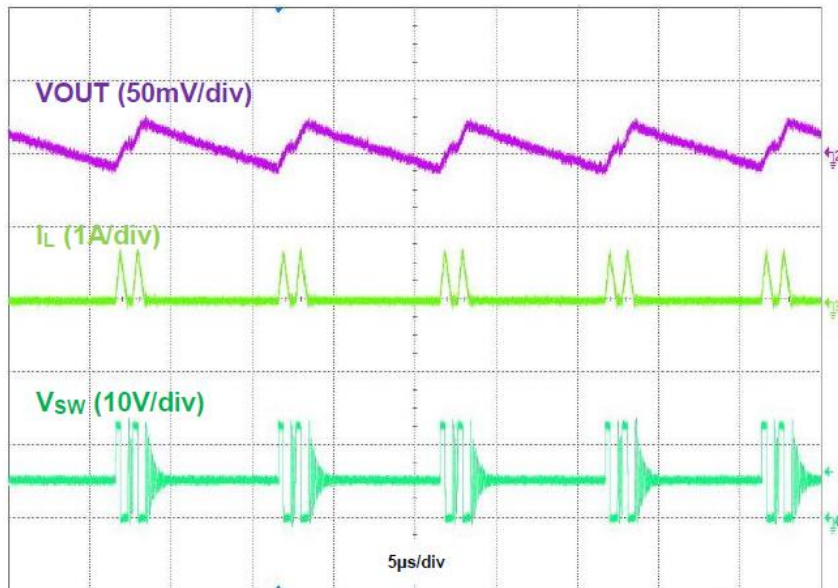
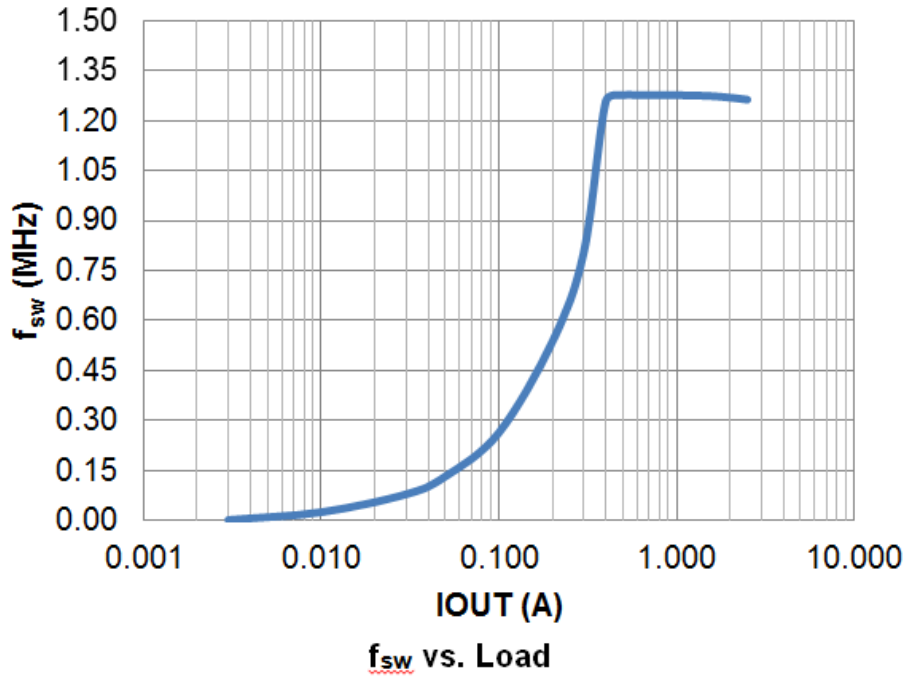


Figure 7. AP62250WU-EVM Efficiency



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